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In any segment of a circle, the greatest perpendicular that can be drawn to the chord, is the perpendicular to the middle of the chord. This perpendicular is the altitude of the isosceles triangle.

∴ The isosceles triangle is the maximum.

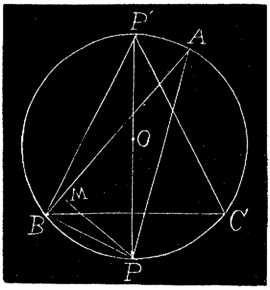
II. Solution by J. M. COLAW, A. M., Superintendent of Schools, Monterey, Virginia, and E. KESNER, Boulder, Colorado.

As the segment may be greater or less than a semi-circle, the general proof is for the circle. In the figure it is obvious that the isosceles triangle $P'BC$ is greater than any other triangle ABC, *as its altitude is greater*. Having the given chord as the common base, the *area* depends entirely on the altitude. But the isosceles triangle is a maximum both in *perimeter* and *area*.

Draw PM perpendicular to AB. Then the triangles APM, $P'PB$ are similar, and the diameter $P'P$ is $>AP$; ∴ $P'B$ is $>AM$.

But $2AM=AB+CA$ (*Richardson and Ramsey's Modern Plane Geometry*, *pp*. 24, 131).

∴ $P'BC$ has the maximum perimeter.



Also solved by *E. L. SHERWOOD* and *G. B. M. ZERR*.

[NOTE.—This problem, with the addition that the isosceles triangle has the maximum perimeter, is Theorem 11, page 131, *Richardson and Ramsey's Modern Plane Geometry*. EDITOR.]

PROBLEMS.

54. Proposed by I. J. SCHWATT, Ph. D., University of Pennsylvania, Philadelphia, Pennsylvania.

Prove geometrically :

If through the center of perspective D of a given triangle ABC and its Brocard triangle $A'B'C'$ be drawn straight lines so as to pass through S_a, S_b and S_c (S_a, S_b, and S_c are the middle points of the sides BC, AC, and AB of the triangle ABC) and if S_aD_1 is made equal to DS_a, S_bD_2 equal to DS_b, and S_cD_3 equal to DS_c then are (1) the figures $D_1O'AO$, $D_2O'BO$ and $D_3O'CO$ parallelograms (O and O' are Brocard's points), (2) the triangles $D_1D_2D_3$ and ABC are equal, and (3) D_1A, D_2B, and D_3C intersect in S, (S is the middle point of OO').

55. Proposed by FREDERICK R. HONEY, Ph. B., New Haven, Connecticut.

Let ab and cd be respectively the major and minor axes of an ellipse, and let α be the angle which a diameter th forms with the major axis ; it is required to find the length of this diameter.